

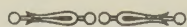
# THE MODERN SCHOOLMAN

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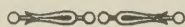
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## Causality in the New Physics

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The quantity of scientific literature coming from the press today on the subject of causality is enormous. That because many thinkers realize that the scientific notion of causality needs revision. To understand the predicament of the scientists it must be borne in mind that causality in their terminology has for a long time past meant something entirely different from what it means in scholastic philosophy. The physicists in particular, far from intending the term to refer to all four of the causes (material, formal, final and efficient), have restricted its application to efficient cause alone. From this, again, they have proceeded to exclude the causality of free agents, and have limited their consideration to necessary causes, to those, namely, which, given certain conditions, act of necessity and in a predetermined manner. Dry tinder put to the fire is a condition from which the burning of the tinder necessarily follows. From repeated experiments of this kind the scientist observes a constancy of results, which constancy he calls a law. On the strength of that law he can predict what will happen if the condition is repeated. He has thus reduced the whole of causality to the fact of predictability. The philosopher will maintain that there

is an *influxus* of the fire on the tinder, and that this influence is the reason why the tinder burns. The scientist, though he admits the influence, is not, as a scientist, interested in that phase of the question; he wants to know the law, the sequence, the predictability.

This assuredly is a very narrow definition of causality. But the end is not yet. Many scientists have further restricted causality to mean mechanical causality. This is really a restriction, because not all necessary causality is mechanical. The vital activity of organisms is necessary causality, and yet it is not mechanical. Why then did these scientists restrict the necessity to that of the mechanical order? Principally because they wished to subject their experimental data to mathematical handling, and could not conveniently do so with any but mechanical data. Mechanics may be represented as the phenomena of mass and motion. Both of these can easily be brought under the category of quantity; and mathematics is the proper instrument for logical deductions in the realm of quantity. Physical quantities are determined in the last resort by some definite distance on a scale or gauge, by some indicator-reading. Distance is easily measured; and motion in-



volves distance. It also involves time; and that again is measured by some distance on a dial. Mass likewise is measured in the same manner. Hence, it is easy to understand the temptation to treat nature mechanically.

But after the physicist had thus neatly set the stage for the development of his science, he discovered that it was not big enough for all the actors. He finds many things in nature that do not "admit of a purely mechanical explanation."<sup>1</sup> And among those things which do admit of such explanation, many do not follow the principle of predictability. One instance of this is radioactivity. Out of 2000 atoms of radium an average of one atom per year will explode, but exactly which atom it will be and at just what time of the year it will explode, no scientist can predict. Likewise in the incandescent filament of an electric lamp certain jumps of electrons are "spontaneous," that is to say, unpredictable. In the face of these facts there are not wanting scientific writers who assert that the uniformity of nature, so sacred to the science of the recent past, is nothing more than the average performance of particles that are behaving with no uniformity at all.<sup>2</sup>

The next actor that can not find a place on the time-honored stage is Heisenberg's "principle of indeterminacy." Heisenberg started out with a very simple fact. The average pressure of a gas on its container is accurately calculated if fairly large areas are taken as units; but on a very small area, such as only one molecule could hit at a time, the pressure oscillates most violently between no pressure at all and the impact of successive blows.<sup>3</sup> In this case the "indeterminacy" is a feature of the physical fact itself which is being measured and averaged. A similar difficulty arises in the attempt to measure a force through a very minute distance. In such an attempt, our accuracy about the force is in inverse ratio to our accuracy about the distance. Our only hope is to strike a rough average. Thus the law of forces is said to be nothing more than a "statistical average," which in turn is a "conscious fiction."

The congestion on the crowded stage is increased still more by Émile Boutroux, who presents the intruder called "The Contingency of the Laws of Nature."<sup>4</sup> In his work by that name, Boutroux begins badly by identifying necessity with regularity. This is really a mistake, because irregular results can be as necessary as the regular. The wrecked train that resulted from the split switch is just as necessary as the smoothly running train that did not split the switch. Boutroux gives the now famous example of a seed accidentally dropped from the beak of a bird flying over a mountain. The seed dislodges a particle of snow on the mountain-top, and that particle dislodges another, and so on, until a tremendous avalanche results from a tiny mishap in the matter of a birdseed. This he calls a case of contingency as opposed to necessity. The scholastic philosopher would say that the mishap was unfree, and therefore necessary, and that had the bird swallowed the seed instead, that wonted act would have been just as much a case of necessity as the unwonted avalanche. But Boutroux makes regularity mean the same as necessity;

hence, irregularity is "contingency." And what has the unwary physicist deduced from the doctrine of contingency? He takes it to mean that all the events of nature may be nothing more than chance. He forgets that chance has a variety of meanings. Three of the meanings pertinent here are: first, an effect that is not foreseen *by me*; secondly, an effect that is not foreseen *by anybody*; thirdly, an effect that was foreseen but not intended. In the first meaning many things in nature are chance happenings. The second meaning does not hold, since the events are foreseen at least by God. This second meaning, however, raises the question about the third meaning, that is, whether they were intended by Him. In replying to this question a distinction must be made between directly intended and permitted. The latter term is usually employed to explain moral evil; but it may be, I think, rightly applied also to certain happenings in irrational nature. The growth of a tree, let us say, is directly intended. The same may be said of the swaying of the tree in the wind, as being a thing good for the tree's growth. But one can hardly say that the particular way each branch sways has a definite purpose all to itself, and that the breaking of this branch or that had a very definite purpose peculiar to that event. These things are incident to the general purpose; nor is it required of divine wisdom, that, where the purpose of creation is served as well one way as another, each particular event in nature should have a purpose peculiar to itself. That each minute happening has a special reason all its own can hardly be shown to follow from the fact that the plan is divine; whereas it is certainly consonant with divine wisdom that different degrees of importance be exhibited in the events of the created world.—In any case, the event is foreseen.

To return to the scientists,—whole legions of scientific men, it must be acknowledged, are thinking and writing without making a *faux pas* in philosophy; a few publicists, however, seek to excite interest without any great concern about the soundness of their philosophy. These latter seem to go on the theory that the more revolutionary an idea is, the more it is likely to prove progressive. Whatever this theory may yield in the field of discovery, its effect on the scientists is that they jump from one rickety conclusion to another with acrobatic agility. The most astonishing leap is from the contingency described above to the conclusion that there is free will in nature. Their approach to this conclusion is devious. Whatever is free is unpredictable; therefore, whatever is unpredictable is free. Aside from this bad logic, they do not seem to realize that the unpredictability of a free act is entirely different from that of any other sort of event. Events in unfree nature, even if "contingent," are knowable from their antecedent conditions. A free act is not knowable *from its antecedent conditions* even by omniscience, because it is not determined by those conditions. But the conclusion is also arrived at from another angle. Many scientists in the past objected to free acts as being "uncaused," that is, unpredictable. And now that there are unpredictable events

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## Reality and Culture

A committee on social trends appointed by the retiring president is reported to have observed "with amusement" that some American colleges "still offer courses which are survivals from the Scholasticism of the Middle Ages."

Let the committee's statement be understood in literal terms. Unless we can hardly say whether we feel amusement or regret at the fact which it expresses.

However, "survivals" signifies that some colleges in our country—and such there are—still ground the *Weltanschauung* of their charges on the perennially satisfying philosophy of St. Thomas, we must express genuine pleasure rather than any regret. And that such a grasp of the nature of reality is necessary for a complete culture will not be denied by any thinking man. It may be a very simple thing that one amass erudition and develop one's intellectual sensibilities. But one can do all this and yet have no appreciation of the laws of being and of truth which give things their real value. In a word—before the ultimate culture is reached, and from the standpoint of the student there must be a certain ultimate, the student must begin to fathom some system of metaphysics which can offer him a correct interpretation of reality, for no revelation or retrogression will ever oblige him to discard. Such is the metaphysics which neo-Scholasticism offers to youth.

Neo-Scholasticism is, in one sense, a survival from the Middle Ages. But it is not such in the sense in which Virgil is a survival from the Augustan Age. Virgil's poetry is indeed instinct with life, yet with a life that is, so to say, crystallized; for it cannot be denied that his work is spatial and temporal, and that it has extra-spatial and extra-temporal values only because of its metaphysical basis—the eternity of beauty and truth. Our philosophy, on the other hand, is a survival in the sense in which the independent spirit of the American people is a "survival" from Lexington and Concord. The American can have more than enough of that spirit with no knowledge whatever of Lexington and Concord. So it is with neo-Scholasticism. It has not survived in written books alone, as Virgil has. It is today as vital as the Scholasticism which fell from the lips of Aquinas in Paris, or Albert in Cologne; and we hope not to be misunderstood if we say that a student may grasp it, may derive from it the rich nurture of his intellectual life without reading or knowing the masters of the Middle Ages.

Such a procedure may be possible. It is not advisable; and this precisely because our philosophy is a perennially satisfying system of metaphysics. It is true that the details in any interpretation of reality will vary from age to age: science progresses in this direction or in that; art gains or loses. But the *suprema principia entis* are unchanged; their beauty is ever ancient, ever new; but they are never more true or less, except to the deepening contemplation of the individual student. Surely that culture which is without such knowledge is at least an inferior one. The enthusiastic philosopher will deem it little worth.

The neo-Scholastic philosophy, then, which we offer as the metaphysics for the cultured is a product of earnest thinking and personal conviction. It is not an amusing survival from other lands and times, but a valuable *Weltanschauung*, which the youthful philosopher makes a part of his innermost being. Truth and reality are one for him, and he does not put his whole faith in metaphysical gymnastics nor rely on the dialectical feats of others—two, or four, or six centuries in their graves. To such an ardent seeker genuine neo-Scholasticism seems (as indeed they are) hardy adventurers making fresh conquests for truth with new weapons and old; and not smug, self-satisfied veterans content to carry on in the old place in the old way—who little reck if there be new lands beyond the seas, much less, beyond the stars. To the speculative and somewhat sceptical modern mind the truth seems very much a thing of today, if not of tomorrow. From this world our own incipient philosophers today are drawn. They are hard-won and ill-weaned. Their intellectual lives need the fullness of neo-Scholastic metaphysics. *Veritas est aeterna*. She is all beautiful; but only speculative contemplation can come to know her face so well as to recognize her at all times and under all circumstances. This knowledge is offered by neo-Scholasticism. This is the proper metaphysics for the cultured. Let us not withhold it from aspirants to their ranks.



## CAUSALITY AND THE NEW PHYSICS

(Continued from page 52)

in nature, these events are set down as uncaused, and therefore free. This only shows the futility of reasoning in words instead of ideas. In line with all this is another argument: since life is not mechanical, and since mechanical means predictable, therefore vital activity consists in its being unpredictable, "spontaneous." Organic activity, emergence, consciousness are in the category of the non-mechanical, and therefore in the same category where you find free will and "spontaneous jumps" of electrons. It would seem that nothing short of a good dose of sound systematic philosophy can ever get such scientists out of the muddle they are in. Without a clarification of the ideas involved in these matters, physical science must either revert to phenomenalism, or, what is the same, despair of any valid knowledge of the world.

Another doctrine that is gaining increasing acceptance in certain scientific circles is that all scientific laws are nothing more than statistics. It might indeed be maintained that the work of science, as distinguished from philosophy, is simply to gather and classify the statistics of natural events and structures. It is not the part of the philosopher to gainsay such a description of scientific laws. But when scientists declare, as some have done, that these statistics are merely the average results of particles acting by pure chance and under no law whatever, the philosopher revolts. These scientists argue that mathematical probability, which deals with chance, affords an all-sufficient explanation of the relative uniformity of nature's laws. In this they make the mistake of not distinguishing, first of all, between our subjective expectation of what is going to happen and the objective determinants which have already specified what is going to happen. Whether or not it will rain tomorrow is determined today; there is no probability, but certainty, on the score of the objective meteorological conditions. My subjective state of mind is one of probability, because I do not know enough of the objective factors to have determinate knowledge. It is true that mathematical probability, which these scientists invoke, does not concern my state of mind; it concerns the object. But here again, one must not forget that there are two kinds of mathematical probability. There is the probability based on a certain set of factors known to be the complete set. Thus in the case of dice, there are just six possibilities for each die. On that basis the probability of a "pair" on a single throw is calculated. An altogether different case is presented when I do not know any of the determining factors, or, if I know some, am not sure that I know them all. How many cases of four-leaf clover will be found in an acre? Here I do not know any of the determinants that produce these "lucky finds." To gauge the probability I must resort to numerical statistics gathered from extensive observation. This probability is of the same sort as that about the one atom per two thousand per year. It is surely not in the same class as the dice, nor the pennies with which Jeans illustrates probabilities.<sup>5</sup> But

whether the number of possibilities be ascertained by experiment (as two for the penny), or by reliable statistics in any case the mathematician will agree that the ratio which he sets down to indicate the probability, is not accurate except for a large number of trials, and that it is perfectly accurate only for an infinite number of trials. Our experience of natural laws is that they are accurate in both small and large numbers of cases. We cannot, assuredly, expect them to be accurate for infinitesimal magnitudes; for, after all, there must be some ultimate unit in nature, whether that unit be indicated by Planck's quantum or not. We cannot expect that there is an infinite regression that the ultimate factors are infinitely small, and consequently, an infinite number of them in every part of nature, however minute that part be. No less than this is implied in the attempt to carry the uniformity of nature down to an infinitesimal scale, to say nothing of the efficiency of our instruments and methods of observation.

This much having been said, it is above all necessary to add that the laws of probability require some determinant, known or unknown. *Pure chance*, as distinguished from the meanings given above, signifies simply this: that no particle of matter is determined in any manner as to how it shall act. But if it may do anything whatever, at any time whatever, then any statement of what it will do has an infinite probability of being wrong at every step of the way. And infinite probability of being wrong is tantamount to certainty of being wrong. Consequently if nature were operating on pure chance, every prediction as to the way it will act would certainly be wrong in a finite number of cases however large and on any scale of magnitude you might choose. To have probability at all there must be some restriction on the possibilities.

Nature is not so delicately poised that the least "contingency" can throw it completely off its course; otherwise the displacement of a single atom would spread chaos order like a conflagration throughout the universe. Nature can absorb shocks, so to speak; it has a certain "give," its course permits some leeway. If that were not true, the free tampering with it on the part of man would long ago have completely wrecked it. But while we do not require an absolutely rigid mechanical model for our picture of nature, we need not go to the other extreme and say that it follows no determinants at all. If, therefore, those writers who wish to startle the public by making astounding statements, desire at the same time to have the respect of their readers, they should at least confine themselves within the bounds of reason.

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# Kant and Empirical Universality

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When with compelling power Kant wrote the preface to *Critique of Pure Reason*, he visioned himself assault- the last stronghold of metaphysics; and the confident of his ponderous phrases is a sort of battle-cry which roused the modern world against that "old queen," he calls her.

"Our reason," he says, "begins with principles which, in the course of experience, it must follow, and which are sufficiently confirmed by experience. With these again, according to the necessities of its nature, it rises higher and higher to more and more remote conditions. But when it perceives that in this way its work remains forever incomplete, because the questions never cease, it finds itself constrained to take refuge in principles which exceed every possible experimental application, and nevertheless seem so unobjectionable that even ordinary common sense agrees with them. Thus, however, reason becomes involved in darkness and contradictions, from which, no doubt, it may conclude that errors must be lurking somewhere, but without being able to discover them because the principles which it follows transcend all the limits of experience and therefore withdraw themselves from all experimental tests. It is the battlefield of these endless controversies which is called Metaphysics."<sup>1</sup>

To resolve the age-old conflict by determining once for all the limits of our knowledge was the task Kant set himself; in his own words, he sought

to institute a court of appeal which should protect the just rights of reason, but dismiss all groundless claims, and should do this not by means of irresponsible decrees, but according to the eternal and unalterable laws of reason. This court of appeal is no other than the *Critique of Pure Reason*.<sup>2</sup>

Now, there was in Kant's mind just one principle according to which the whole investigation was to be governed, a principle which had long since been engendered in his fertile mind by a hint which he found in Hume's analysis of the principle of causality. Hume had stated

the knowledge of this relation [cause and effect] . . . arises entirely from experience, when we find that any particular objects are constantly conjoined with each other."<sup>3</sup>

"When one particular species of event has always, in all instances, been conjoined with another, we make no longer any scruple of foretelling one upon the appearance of the other. . . . We then call the one object, *Cause*; the other, *Effect*. . . . After a repetition of similar instances, the mind is carried by habit, upon the appearance of one event, to expect its usual attendant, and to believe that it will exist."<sup>4</sup>

This analysis of causality, although patently false to Kant's metaphysical mind, yet served, as he says, to rouse him from his "dogmatic slumber," and gave him the idea which he expanded into a full-blown system of reason. He saw, he saw, not only concepts, but even principles, which are above and beyond experience, universal and necessary; and yet all our experience is merely of the particular and contingent. It is not mere habit, as Hume thought, which leads to such universal and necessary knowledge;

for one experience is sufficient to give us a universal principle; nor can empirical knowledge, of itself, ever take us beyond experience. Therefore, Kant reasoned, such *a priori*, necessary and universal knowledge must spring from the pure understanding.

"I therefore first tried whether Hume's objection could be put into a general form, and soon found that the concept of the connection of cause and effect was by no means the only one by which the understanding thinks the connection of things *a priori*, but rather that metaphysics consists altogether of such connections. I sought to make certain of their number, and when I had succeeded in this, by starting from a single principle, I proceeded to the deduction of these concepts, which I was now certain were not deduced from experience, as Hume had apprehended, but sprang from the pure understanding."<sup>5</sup>

This, then, is the fundamental principle of Kant's *Critique*: Whatever is universal and necessary in our knowledge is *a priori*. Hence, he sets himself to the great task of spinning the rich world of thought and reality out of the stuff of the pure understanding and the mere phenomena or appearances given by experience. Even the senses have their *a priori* part to play in the synthesis of the object; for the ideas of space and time are not derived from the object, but are *a priori* forms of sense perception. The imagination has to synthesize its images; concepts are produced by the action of the forms of the pure understanding, the categories. Kant deduces these categories by considering that all the acts of the understanding may be reduced to judgments; and, since judgments are concerned with the relations between things, rather than with things themselves, if we analyze the various types of relations found in judgments, we will find the fundamental forms of thought. It is the categories, he thought, which give universality and necessity to our thought, and engender in us the "transcendental illusion" by which men have been enticed into the realm of metaphysics, far away from experience, deluded by the deceits of the pure understanding.

To illustrate this *a priori* world of thought and reality is beyond human power, for the simple reason that, to set about building up the world from within, it is necessary to begin with things no man has ever seen. What phenomena are, unmodified by space and time, is impossible for us to imagine; in fact, the deduction of this marvelous world of law and beauty from the unknown "given" of the senses, and from the pure forms of sensation and thought, is a process so magical that we are tempted to say, as Kant himself said of a part of the operation, that it is "an art hidden in the depth of the human soul, the true sense of which we shall hardly ever be able to understand." Kant's commentators have come to such varying



conclusions about his meaning, and have belabored each other so heartily and with such thorough mutual contempt, that we may save ourselves much useless pain and conflict by leaving the whole matter where it belongs, "hidden in the depth of the human soul."

The most damning objection to Kant's whole system is that he destroys not only science, but his own *Critique* as well, by assuming that what is necessary and universal in our knowledge must be *a priori*, and that what transcends experience must spring from the pure understanding. Is it not the very aim of all science to transcend experience, to discover causes which in their application are necessary and universal? If every universal statement which Kant makes in his *Critique* is determined merely by one of the forms of his pure understanding, then he is leading his readers into the same "transcendental illusion" which he thought the "old queen" metaphysics had been engendering in men. For, if he is seeking to prove that our universal knowledge springs from the pure understanding, he must first have a universal knowledge of the nature of the pure understanding. Kant himself seems to have appreciated this difficulty when he said:

"The logical functions of judgments in general, namely, unity and plurality, assertion and negation, subject and predicate, cannot be defined without arguing in a circle, because the definition would itself be a judgment and contain these very functions."<sup>6</sup>

Again, he admits:

"I have pronounced judgment against myself by saying that in this kind of enquiries it is in no way permissible to propound mere opinions, and that everything looking like a hypothesis is contraband; that must not be offered for sale at however low a price, but must, as soon as it has been discovered, be confiscated. For, every kind of knowledge which professes to be certain *a priori*, proclaims itself that it means to be taken for absolutely necessary. And this applies, therefore, still more to a definition of all pure knowledge *a priori*, which is to be the measure, and therefore also an example, of all apodictic philosophical certainty."<sup>7</sup>

But he goes no further. The implication of absolute scepticism which follows logically from his position he does not attempt to remove, because, perhaps, he could not if he had tried.

But, aside from the fact that Kant is unable logically to avoid scepticism, the assumption that what is universal and necessary in our knowledge must spring from the pure understanding does not square with reality. It is not only the unifying tendency of the mind which draws a universal conclusion out of its experience of particulars; before we can feel justified in doing so, we must also see a reason, a causal connection. The mind is determined by objective evidence. Thus, knowing that water expands when it freezes, we are perfectly justified in making a universal statement that ice will float in water, *because* the density of ice is lower than that of water. And, in so far as it is a universal statement, it carries us far beyond experience to a necessary conviction.

The chemist knows that all sodium must be kept in oil, not in water, since he is certain that it is *of the nature of* sodium to react violently with water. He does not have

to chip each separate bar of sodium and test it with water to confirm his knowledge; he knows the properties of the element, and he has objective evidence upon which his knowledge is based. Kant, however, would say that the universality of the conviction that sodium reacts with water is merely an "assumed or relative universality (by means of induction), so that we ought always to say, so far as we have observed hitherto, there is no exception to this or that rule."<sup>8</sup> But it is easy to see that if this were the case, the only logical thing to do would be to throw away the text-books and remove the labels from all the bottles on the laboratory shelves. We would have to feel and test and experiment our way through each separate reaction, without ever rising with security to anything like a law. If physical certitude about the natures of things is not universal, then science is a delusion, and we are victims not only of the "transcendental illusion," but of the "scientific illusion" as well. For, in spite of Kant, these two "illusions" are inseparable.

That we do reach some knowledge, however restricted of noumenal reality, that is, the essence, the nature of things, is a fact we cannot stress too strongly; for in it lies the refutation of Hume's analysis of causality, Kant's analysis of reason, the whole English empirical school, modern agnosticism and positivism. We know that ammonium hydroxide *as such* reacts with sulphuric acid *as such*; we know that it is a property of hydrogen and oxygen to unite, under given conditions, to form water; we know that it is essential to the action of the mind to be spontaneous, not reactive; and we know, not only because we have, in our experience, always seen them acting constantly thus, but because we have real *insight into the nature of* things. Kant is not only inaccurate, but utterly destructive of science when he says that "empirical universality . . . is only an arbitrary extension of a validity which applies to most cases, to one that applies to all,"<sup>9</sup> and "experience . . . never gives us any really general truths."<sup>10</sup>

If that were the case, an exception to a certain fact of experience would lead us, not to look for a cause of this exception, but to revise our certitudes. As a result, science would soon be in a state of utter confusion. Suppose for a moment that, thinking I have supplied all the proper conditions, I combine hydrogen and oxygen gases in order to produce water; yet no reaction and consequent formation of water follows.

If I admit the possibility that my past experience has now been nullified by a chance exception, if I do not look rather for a cause of the exception, for instance, the absence of a condition which is necessary for the interaction of these elements, I have completely undermined the trustworthiness of the science of chemistry. It follows that science cannot rest on a Kantian basis; it follows that Kant, when he made his epoch-making distinction between knowledge *a priori* and knowledge *a posteriori*, sapped the foundations, not only of metaphysics, but also of all knowledge worthy of the name.

Did he not see that should he drag the "old queen"



metaphysic from her place of eminence, all other science, including his own *Critique*, would likewise go down into scepticism? Did he not see that all knowledge worthy the name "enlarges the sphere of our judgments beyond the limits of experience," precisely because the mind grasps something essential and universal in objects, and whether we know little or much, still what we do know sets us free from the inconstant and tyrannous hand of trial-and-error experience?

Fortunately, Kant's *Critique* cannot stand,—it is even now tottering—because we have, as a matter of fact, certitudes both physical and metaphysical, which are necessary and universal, and which do not spring from the pure understanding, but are founded on objective evidence. Paradoxical as it may seem, metaphysics still holds her high place even in the minds of the most positive exponents of the school of experience; for, as a science, she reduces to exact and accurate form certitudes which are so deeply

imbedded in our thinking processes that with most of us they are direct and implicit. It is the part of the philosopher to uncover them and dress them up for display, not to fly off on a tangent and behave as if they do not exist, whereas all the time he is implicitly making use of them.

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## The Return to Reality

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What is it that makes confusion in the mind? It is the collapse of that upon which the mind had reposed upon reality. So, for example, until yesterday men had reposed, implicitly, it is true, but none the less contently, upon the economic dogma that money is naturally productive of more money, that promises by proxy to pay are themselves capital wealth. Generations previous to our own had naively believed in the multiplication of loaves and fishes; it was reserved for us to credit the multiplication of the million-dollar bills. When we finally ceased to rest our whole weight on that dogma, it collapsed. At the first effect of that collapse there came, and there remains, confusion in the mind.

And these things that collapse—they are always things that were never meant to bear the whole weight of the mind, but on which nevertheless men attempt to find an intimate repose. Everywhere the process is the same. The mind has not the "stuff" to go beyond the symbol to the reality, beyond the picture to the thing, beyond the means to the end. It lolls lazily on the thing nearest to hand; there is a collapse, and confusion in the mind.

History is full of the process. Politically, for example, the thing appears in the development of the French monarchy during the Eighteenth Century. The genius of Richelieu had effected the centralization of the full social momentum and governing authority of the French people in the single institution of the monarchy. The mental and moral energy necessary to inform that central authority the successors of Richelieu did not have; they fell back on a machinery external to that authority, the apparently substantial scaffolding of a bureaucracy. The machinery

multiplied; the mind became less and less able to penetrate through the mass of matter to the realities of the state, to the ends of government; it reposed, at last wholly, upon the mechanical functioning of a mindless thing. So came the Revolution.

The identical process appears historically in the multiplication of ornament in architecture, in the stiffening of poetic form, in the more absurd aberrations in dress and manners, and, generally, in all of those developments in human affairs which men of a later age come to call "unreal." In philosophy the thing is apparent. As an example not too uncomfortably close to home, there is the philosophy of the later Middle Ages. St. Thomas Aquinas had constructed a philosophy on the basis of a vast vision of reality. For him, as for every scientist, technical language had been a necessity; but he had used it, only in so far as it was a necessity, prescribed by the realities with which he dealt. His successors, lacking what Hilaire Belloc calls "the strong stuff of the mind," substituted for an apprehension of reality the technical apparatus of verbal sub-distinction; upon the word alone they reposed the whole weight of the mind of man. The word could not bear it; the whole business collapsed in confusion.

Upon this confusion of mind there follows always another mood. As, in a flood, men fly to the high places, not alone to escape the waters, and their death, but to find some solid ground from which to survey the ruin, and on which, if need be, to meet their end, with knowledge, and looking upon its face; so the mind, disappointed in that on which it had reposed as upon reality, gropes frantically for some word or thought or thing upon which



to ground itself, if only that it may see the ruin, and understand what thing it is that has happened. Of a society over which such a mood has come, we say that it is in a state of unrest—and our own society is in a state of unrest.

What is the meaning of the confusion, the unrest and uneasiness, of modern society? It is society's spontaneous testimony against itself: society's admission that it has reposed upon a *fiction* of reality. By our uneasiness and disquiet we confess our inability to penetrate through the confusion of words, of ideas and ideals, of institutions and of ends—our inheritance and the work of our own hands—to penetrate through all of these to the things that are. But there is this great difference, is there not, between the perturbations of our own society and the turmoil, say, of the first days of the French Revolution, that the confusion and uneasiness of the Revolution were much more of a corporate thing, an evil of the mind of society, while our own unrest has its root much more in the confusion of the individual mind, a confusion reacting only indirectly upon the whole body of society. The modern poet, the trumpeter who gives forth so uncertain a sound, is disturbed and restive much less because he must live in society than because he must live at all.

That we are as individuals badly confused, that our minds are *settled*, almost, in a habit of unrest, that after our feverish searchings for some central secret of repose we have about resigned ourselves to perpetual motion in the mind, these are our common-places. But certainly we have sought this longed-for "repose" in strange places. We have isolated our experiences one by one, as no doubt we should; but what strange experiences! One feels the mind fall into bits, as each human experience after the other is isolated; tested for the bearing of the full burden of intelligence. Mental pictures (not infrequently obscene), the whole inheritance of philosophical ideas, images from nowhere in particular, the dreams of the latest madman, vast doubts that sweep from the pinnacles of being clear away to an unthinkable nothingness—we have tried them all; we have isolated every human experience—except one. There *is* one experience which we have not isolated; it is the one in which the mind touches bottom. If we are to break our mental furniture up into bits, if we are to isolate each solitary experience, we would do well to isolate this one. For here if anywhere the individual mind, and, through the individual mind, society, can make contact with reality.

And first of all, if a man would isolate this experience, there is required of him an effort of will; not an effort to hold the mind in the strait-jacket of an artificial acquiescence, but an effort that will bring the wandering mind sharply round, hold it steadily along a single straight line of action, and so bring it at last to bear upon the central point of its experience.

For the mind does not act in a void; it acts from a central pivot of repose. From that center it acts in an orbit of ever-increasing radius, not in order to *find* repose, much less to *make* it, but to *extend* it. Doubt and denial and

affirmation extend over a wide surface, but they are centered at a single point, and if a man would get to that point he must go back through all of them and beyond. In order to isolate that central point of repose, the mind must retire along its radial lines of communication, ignoring every phantasm, passing by every reasoning process, every affirmation, every denial, every doubt, until at the center it strikes against a single and simple something upon which it finds itself immovably anchored, the mystery and the marvel to which we testify in the word "*is*."

Here certainly, in this word, we touch bottom; in this word, alone of all that are spoken, does the mind find an absolute and unquestioning repose. We say that certain things are "real," others "unreal." What do we mean, except that they have or have not a reference to this which we experience, when we say "*is*"? We join a subject and a predicate, or we refuse to join them. Why do we so act, except because we can or cannot find between subject and predicate a place for the word "*is*"? In this experience the mind comes to a full stop; in this experience it reposes absolutely; in the presence of this, doubt and denial and affirmation are words only, since doubt and denial and affirmation are at the circumference, and this thing is at the center. To this word "*is*," simple among all words and supreme, we do well to pay the tribute of a great and lasting wonder.

But if wonder is the beginning of philosophy, as the Ancients tell us, it is not the whole of philosophy. There is a second tribute which we must pay to this "*to be*," to *the real as such*, the tribute of analysis. That is metaphysics, and that is what I mean by "*the return to reality*." A society composed of men so badly shaken as ourselves, of men so weighed upon by the whole inherited confusion of imaginative difficulties and abortive moods, a society such as our own shall not return to reality, until some of us return to reality as such. How far indeed we are from reality is shown clearly enough in that strange inverted attitude of ours, which makes of metaphysics, the science of the real as such, a thing *unreal*.

Obviously, all men are not metaphysicians, unless in the very broadest sense; yet are their habit and mood largely determined by a metaphysics, a metaphysics of which they can give no account, but by which, none the less, they live. One would like to see the man who *could* give an intelligent account of the metaphysics by which *we* live: metaphysics of a single absurd assumption, metaphysics resplendent with the stark madness of affirming that it makes no difference what I mean when I say that something *is*.

I think that we have heard about enough of that sort of thing. No; we shall not find repose, we shall not be rid of our manifold despairs, until we shall have returned with Aristotle and St. Thomas Aquinas to the central marvel and mystery of the real as such; until we shall have held our minds, strongly and with an enduring patience, against this firm thing and unfailing, this strange thing of far and lofty splendor, this thing "*to be*."



# Matter and Form in Plato's *Timaeus*

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ould be scarcely surprising to find one who holds exaggerated and violent Dualism of Plato arriving at passé when he tries to explain the ultimate constitution of the material universe. For, the complete separation of sense and intellect, and of the objects of sense and intellect, leaves a gulf which, in the end, the oft-repeated "will fail to bridge. Even the Peripatetic solution with its transcendental relation between matter and intellect and the fundamental intelligibility of sensible objects noted in the formal principle of their being, does not furnish an explanation that is immediately or intuitively intelligible.

Before entering upon a consideration of what Plato says in the *Timaeus* by his equivalents for the matter and form of the Schoolmen, we must first recall his characteristic twofold division, Ideas and Sensibles, so marked in all of the great dialogues; and secondly, we must ask what value he attaches to the cosmological speculations of the *Timaeus*, where this doctrine is chiefly treated.

These have all long been familiar, so Plato himself supplies an opening this phase of the discussion, with the two divisions: on the one hand, the model species, apprehended by the intellect and ever unchanging; and on the other, the imitations of these models, generated and visible. He adds: "The third kind we did not distinguish at all, conceiving that the two were enough. But now argument seems to require that we should make clear a third kind, which is difficult of explanation and dimly apprehended" (49a) It is of the former, the Ideas, that he is speaking when he says in the *Phaedo*:

"There are essences . . . each of them always what they are, having the same simple, self-existent and unchanging nature, and not admitting of variations at all, or in any way, at any time."

He speaks of the latter, the Sensibles, when he says:

"The many beautiful are they all unchanging and the same or quite the reverse? May they not rather be described as most always changing and hardly ever the same either by themselves or with another?" (78d-e)

Thus this divorce of the sensible world around us from the intelligible world to which the philosopher is stimulated by the sensible things the student of Plato is confronted with.

It is one of the most characteristically Platonic divisions. But it brings in its wake insuperable difficulties. These we meet in the *Timaeus*. What, then, is the purpose of this dialogue? The fact that Plato is primarily concerned only with the ethical side of philosophy—with its powers of leading men to the genuine 'being'—does not give us a sufficient motive for regarding the *Timaeus* as a bona fide attempt to explain the material universe. Nor does the cloaking of this doctrine in myth and allegory render it unfit for scrutiny.

We must at least conclude with Albert Rivaud in his introduction to this work that,

"Ainsi le *Timée* est un mythe, mais c'est un mythe vraisemblable, qui traduit autant que cela est permis à la faiblesse humaine, les vérités les plus hautes auxquelles, en ces matières, l'homme ait pu parvenir."<sup>1</sup>

Plato, left to himself, would no doubt have preferred to push into the background all such speculations, since he subscribed to the Socratic thesis that the upshot of such study was too often a failure "to see the forest for the trees." But Plato was not entirely left to himself. We shall perhaps be closer to the truth than we think if we see in this dialogue an attempted answer to the youthful Stagirite waking the calm of deep-grooved Academus with his queries for an explanation of this "participation." And we find the uncertainty of the master in the prayer which precedes the discussion of this matter: "God be our savior out of a strange and unwonted inquiry and bring us to probability." (48d)

If, then, Plato is to explain the relation of Sensibles to Ideas he must do so either by finding a link between these two, or by regarding the Sensible as the mid-term between Idea and a "third genus." His own preconceived notions force him to attempt the latter. As Zeller points out, Plato had regarded

"Ideas as the only true existence: he regards the sensible Phenomenon as a middle term between Being and Non-Being; that to which only a transition from Being to Non-Being, and from Non-Being, only a Becoming and never a Being, can belong."<sup>2</sup>

For the Sensible is not an absolutely self-dependent existence, but all its being is being by means of another and in relation to another. If, then, the Idea is our formal principle, we must seek a principle of multiplicity, of imperfection, even of non-existence—a principle contradictory to the principle of being and existence found in the Ideas. Consistency will force Plato to call upon a purely non-existent principle. This principle will then be the Platonic *matter*. (It is well to note here that "ύλη" is not used in the Aristotelian sense in the *Timaeus*. When it does occur in 69a it is used in the sense of "raw material" upon which a carpenter might work. Throughout the portion of the dialogue we shall have under consideration (48d-56a) the Platonic terms are "receptacle of generation," "nurse of generation," "mother" of generation, "impressible mass." In 52b it becomes "space" and "place.") This material principle must evidently be free from any forms, for

"what is to receive all forms should have no form; as in making perfumes they first contrive that the liquid substance which is to receive the scent shall be as free from odor as possible. Or as those who wish to impress figures on soft substances do not allow any previous impression to remain but make the surface as even and smooth as possible." (50e)



For this reason, then, this substratum,

"the mother and receptacle of all created and visible and in any way sensible things is not to be termed earth or air or fire or water or any of their compounds or any of the elements out of which they are composed, but it is an invisible and formless being which receives all things and attains in an extraordinary way a portion of the intelligible and is most incomprehensible." (51a)

Still, Plato says that to this principle alone belongs that permanence, in virtue of which a thing may be designated as *this* or *that*, and that what we term *this* or *that* ought rather to be termed "of such a kind." (50a) But how are we to reconcile this permanence of Platonic matter with the absolute non-existence which, as we have seen, is the principle which must be combined with the complete and exhaustive reality of the Ideas? This concept of the impressible groundwork places along with the Ideas a second eternal order sharing with it the sum-total of Reality and yet, *ex supposito*, completely independent of it.

A further problem arises here, that of our comprehension of this "nurse of generation." Plato is led into a serious difficulty arising from his own system of cognition. The intellect, for him, does not abstract its knowledge from the particulars of sense, but goes immediately to the intelligibles, which alone are the true objects of real knowledge. The "true opinion" of the things of sense finds its explanation in the fact that they participate the objects of true knowledge. But how are we to explain our apprehension of this entirely formless principle of non-being? Plato is scarcely at pains to conceal the embarrassment which arises from this unexpected quarter. His whole system of Reality has been postulated to render an easy explanation of our cognition, as well as to afford a basis for his ethics. There now seems a poetic injustice in the failure of intellect to provide him with a third species to answer to the third genus of reality that the present discussion has forced upon him. All he can say is that we perceive this "third nature which is space . . . by a kind of spurious reason . . . which we behold as in a dream. . ." (52b)

Plato now speaks of his material element as "space." He sees that the "impressible mass" is already too corporeal to be accepted as non-being. He now attempts to remove the substance from the matter. The residue, space, gives him, it is true, a more intangible background, but the difficulty remains. No mere "being of reason" this "space" of his. And Aristotle objects to this unlimited space which Plato has made a principle of things "in the sense of a self-subsistent substance and not as a mere attribute of some other thing."<sup>3</sup> Once more Plato has failed. He has endeavored to give us a principle that is not-being and has ended with a principle which has fuller and richer being than Aristotle's "matter."

It is with this shadowy entity as that "in which generation takes place" that Plato finally dismisses the question of the material element in Sensibles. But, if the difficulty on the side of matter has been reduced to its least dimensions, it has become correspondingly grave from the point of view of form. For Plato the form should be something quite immaterial; but now, since it must fill empty

space, it must be at least partially material and certain composite. A subsisting Idea can not of itself fill this void and for Plato the notion of a physical co-principle is of the question. He ever thinks in terms of full-blooded reality. To meet the difficulty he endeavors, and fees enough, to find a way out through the medium of geometrical figures, which are to be the forms of the four elements and all that is developed from them. The calculations here employed are ingenious enough, but not to our present purpose. Suffice it to say that geometrical plane figures can not fill space; hence, these intermediates serve but to complicate the exposition. It is probable that this union of Idea with spatial magnitude in the composition of the formal principle and the consequent complexity is the source of Aristotle's complaint that Plato has ended making the material principle of Sensibles the material principle of Ideas.<sup>4</sup> We may, indeed, agree with Zeller that the Philosopher goes too far in forcing this doctrine upon Plato to the extent that he would have at one and the same time to conjoin with his Ideas a material element and yet demand for them an existence essentially different from that assigned to sensible things, precisely because of the material element in the Sensibles. Still, we must confess that the misapprehension is due to the vagueness of the doctrine, and that the open contradiction is avoided only by Plato's failure to push his system on to its ultimate conclusions.

Thus, in short, in endeavoring to bring together absolutely contrary elements of Being and Non-Being, the matter and form of sensible objects Plato is forced first to assign intangible, yet full reality to the material element which should lack all being, and then to subtract a corresponding amount of being from the formal element where all reality was lodged; and, having now orders of partial realities without any transcendental relation to each other, he finds himself as far as ever from an explanation of the sensible world.

The phantasms of the poet have proved too gross and vivid for the discriminations of the philosopher. Plato has been too quick and generous in assigning entity where it should have been denied; the stingier Aristotle, by doling out more sparingly, has left us the basis of a philosophical account of the universe. But if the close, irresistible reasoning of Aristotle has enabled him to pierce through the very essence of nature, Plato's divine intuition has covered for him its supreme meaning. This he shows again at the very end of the dialogue when he concludes that the universe is "the sensible God who is the image of the Intelligible, greatest, best, fairest, and most perfect." (92c)

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## Relative Space

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the minds of many who are interested in the philosophical problem of space there has no doubt arisen the question: "What is meant by the expression, 'the concept of space is relative'?" That the concept of father or son is relative causes us no difficulty; but that the concept of space should be relative,—this leaves us in a perplexed state of mind. Nor can one untrained in the natural sciences find much illuminating information in the writings of the Relativists themselves. For example, if we turn to the works of Einstein for an explanation of what we have to be satisfied with something like the following:

In the first place, we entirely shun the vague word 'space,' which, we must honestly acknowledge, we cannot form the truest conception, and we replace it by 'motion relative to a practically rigid body of reference.'"<sup>1</sup> I am ever glad we may have been to meet a passage in which, when it mentions space, we must, after reading the above, honestly acknowledge that we are left quite ignorant of what the Relativists mean by *space*, to say nothing about what the *relativity of space* might mean.

As philosophers, we know what is commonly meant by the word "space." If it means simply the extended bodies themselves, then the term "space" is used in a restricted sense. If it means more than that (and it usually does) "space" means a fiction of the mind, which has, however, no foundation in reality; it means pure extension regarded as that in which bodies exist and move. All Relativists, as we shall see, use "space" not in the second sense, but in the first, namely, existing bodies. Still, even in this sense they never consider extent absolutely, that is, the extent of one body alone, without reference to any other body.

Rather, they always consider one extended body in reference to another which is chosen as a measure; they consider extent relatively, they ask the *size* of a body. In this meaning in mind, we can see that there may be a truth beneath the apparent absurdity of relative space.

It is not my intention to champion the Theory of Relativity. It is a scientific theory, and ought to be so regarded and further substantiated by facts or cast aside as inadequate.

It does, however, seem time to stress the fact that a scientific Relativist, whether he himself realizes it or not, when dealing with his problems of space, time, or dimensional continuum, is speaking about something quite different from our philosophical space, time, or dimension. To lose sight of this fact is to create an imaginary host of enemies about the philosopher's camp, and it is worse, to make the scientist feel that every theory he advances, or fact he unveils, is just so much more fire being hurled against the philosopher's stronghold. It cannot be denied that many, especially the popularizers of relativity, have uttered exaggerations in the name of

Relativity; foolish epistemological theories have sprung up, theories which are supposed to be grounded on Relativity in Physics. Such errors should be exposed; but care should be taken that the good be not thrown out with the bad. Although the Relativists say things unheard of until now, we ought not for that reason be too quick to condemn. If we do not understand what they say, it may simply be that we have failed to see their viewpoint.

Before proceeding to the problem of relative space itself, it will be well to recall that the scientist is generally concerned only with things measurable, in order to differentiate or integrate them. In the ultimate nature of things he is not interested. Hence, we may immediately suspect that when the scientist deals with space, he is considering it not in a philosophic sense, but as something which he can subject to measurement. That this is the nature of the Relativists' problem we can discover by turning to their own explanations.

Since the Relativists' definition of space, as we have already seen, formulated in their own technical language, helps us but little, we shall accordingly go to their explanation of how space is relative in the world as we know it. To avoid confusion, the reader should note that we are not concerned here with the physical justifications for the theory of relative space or with the Relativists' own arguments in support of their theory; neither are we interested, at present, in "curved space," a problem different from the one we are now discussing. Throughout this paper there is question only of what relative space *means*.

Relative space means that the *length* of a body, for instance, the length of a meter stick, does not appear the same for various observers who, while measuring this body, are moving at different velocities. The length which each observer notes in the body is determined by or dependent on the circumstances under which the measurements are made. For this reason the varied observed lengths are considered as *relative* to particular moving systems from which each observation of length is made. We have an example analogous to the Doppler effect in sound. The whistle of a train is adjusted to give the note *b*. An observer toward whom the train is moving hears the whistle, but for him the note is not *b*; it is *c*. At the same time another person behind the moving train hears a lower note, *a*. In relativistic terminology the note *c* would be considered relative to one definite reference system. This reference system is the one toward which the train is moving. The note *a* is relative to a different system.

To what is the observed length of a body relative? It is relative to a definite observer or reference system. One system will find a body to have a certain length, whereas another system will find a different length. The changes of length for different systems of reference must not be



looked on as something purely arbitrary. Just as the changes of pitch in the Doppler effect depend on definite circumstances, so also does the change of length depend on definite circumstances, namely, relative velocity. Relative velocity is that velocity which is found to exist between two bodies. The velocity of a body must be calculated from some definite system of reference. This is a very important phase in the Relativity Theory. In it there is no place for absolute velocities of particular bodies, since this supposes a unique system of reference, to which the velocity of all bodies might be referred. Such a system has not been discovered, and, according to the Relativists, will never be discovered. To ask the Relativist, then, how fast a certain star is moving *in itself* would be the same as if someone were to ask you how far the earth is. You would inquire how far from what? So, when the Relativist speaks about the velocity of a body, he considers it from some system from which the velocity is to be judged. This is relative velocity. It is to the relative velocity between the body measured and the system from which it is measured that the change in length of a body is proportional. Strange as it may seem, this variation of observed length of a body is what is meant by relative space.

What does this mean in the concrete? Suppose there are two huge passenger-carrying rockets, X and Y, located in some distant region where the occupants are unable to see any celestial body. The relative velocity between the two as calculated from X and Y is 45,000 miles per second. The observers on X will consider themselves as the rigid system of reference, and according to them, Y has the speed of 45,000 miles per second. At the same time, those on Y can maintain that they are the rigid system. The observers on X then measure the *length* of Y, and let us suppose they find it to be ninety-eight yards long. Let us now further imagine that a third rocket, Z, is moving parallel to Y, in the same direction, and at the same speed. There is no relative velocity between Y and Z. Those on Z also determine to measure Y. According to them Y is one hundred yards long. Perhaps to our surprise, we see here that Y has two lengths, ninety-eight yards, as calculated from the reference system X, and, at the same time, one hundred yards, as calculated from Z. We ask Einstein which of the two measurements is correct. He answers: "Both!"

Thinking that the principle of contradiction is at stake, we may insist that one and the same body cannot have two different lengths at the same time. Einstein and his collaborators will answer that the concept of space is relative.<sup>2</sup> And by this they mean, as stated above, that the observed length of a body is relative, depending on the reference system from which it is observed. All of these things will not seem so paradoxical to us if we remember that the Relativists do not say that a body has *in itself* two different lengths; their contention, based ultimately on the principle of finite propagation of light and the impossibility of determining absolute motion, is that there is no reference system moving relative to the object measured which can maintain that it alone makes the correct measurement and that the measurements made from other relatively

moving systems are wrong. It is as in the case of sound. He who hears the note *c* cannot say that another observer who hears the note *a* is wrong. Each is correct as far as his own position is concerned. In Relativity Physics it is a law that a body moving relatively to the observer manifests less length than when it is at rest relative to the observer.<sup>3</sup>

The Relativists, then, mean nothing more by their relative space than *existing bodies whose observed length varies for different systems*. Such is the impression one constantly receives in reading their works. When these men wish to show that space is not absolute, as Newton maintained, we find them arguing as follows: ". . . the length of a body is not a fixed property of it, but is relative, depending on the conditions of observation — the relative velocity of the observer with regard to the body."<sup>4</sup> Hermann Weyl, one of the leading authorities on the Theory of Relativity, gives us in his book on Relativity the same idea concerning the meaning of relative space. He illustrates the relativity of space by showing how, according to the Principle of Relativity, a certain plate at rest when being measured be found to be perfectly round, but when in motion, it will be observed to be an ellipse.<sup>5</sup> In other words, the moving plate appears shorter in the direction of motion. Einstein himself leaves the same impression on us as to the significance of relative space. In *Relativity*, he tells us that the length of a rapidly moving train would be discovered to be longer when measured by one inside the train than by one who performed the measurement from an embankment outside the train.<sup>6</sup>

From what has been said so far it ought to be clear that in the Theory of Relativity the question of relative space means nothing more than that the observed length of a body is not always the same, but varies with the relative velocity. If we may speak of space as relative because the measurable length of a body is variable, then we may logically conclude that the Relativists mean by space nothing more than physically extended bodies as we know them through scalar measurements. Eddington tells us that "When he [the Relativist] speaks of space, he means the space revealed by measurement."<sup>7</sup> There is here no question of the relativity of the abstract concept of extension. Relativists, it is true, frequently speak about the relativity of the concept of space and length, but this is not to be interpreted too literally in a philosophic sense. What they mean is plain from their works.

Unless we are to quarrel over the use of such words as "space" and "concept," it ought not be difficult to understand the Relativist's meaning of space. We may find it hard to follow the scientific arguments for his relative space; that is, we may not understand *how* the measurable length of a body may vary in different reference systems. In short, we may find it quite impossible to change our world-view to that of the Relativists. But in the face of all these obstacles we can rest assured that the Relativist's space is something different from the philosopher's, and that it in no wise compromises the philosopher's concep-

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# The Grecian Fount of the New Humanism

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is worthy of remark that the protagonists of the New Humanism, while holding, both as a first principle and as an ideal, the universal selection of "constants" from all ages and traditions, yet unanimously admit that the ultimate source of humanism is the tradition of the classical literatures, particularly that of Greece. "If I must name the fountain," writes Norman Foerster, "I am bound to name Greek Humanism," and he goes on to name more specifically Plato, Aristotle and Sophocles.<sup>1</sup> Others are no less frank and ready in this admission.<sup>2</sup> Still more worthy of remark is the fact that some of the Humanists, by thus claiming continuity with the great Greek thinkers, differ radically from them on matters fundamental and vital to the existence of a true humanism. A striking example of this is the gulf that yawns between certain modern Humanists and that paragon of Greek thinkers, Plato. Plato and the New Humanists of whom I speak agree that the essential aim or ideal of humanism is the full and harmonious development of man as man, according to the measure of his nature. But it is on this very question, where at first sight there seems to be complete accord, that conflict arises; for certain of the New Humanists have adopted first principles that repudiate any union with such a thinker as Plato, and, at the same time, fall short of the highest, the true, humanism.

Plato held as an ideal the perfection of man as man. We immediately perceive that we must put it down as our first principle that the *criterion* of this perfection is not man, but something prior to and above man; it is the divine. In this conception it matters little what mistakes Plato may have made as to the nature of *to agathon*, which, as he describes it in the *Republic*, is apparently divine.<sup>3</sup> What does matter greatly is this: He recognized that man, if he is to attain to perfection as man, must of necessity seek his guide and model in *to agathon*, in an extrinsic criterion superior to himself. Moreover, Plato conceived that this tendency to seek conformity with *to agathon* is man's natural power; to achieve conformity is man's perfection.<sup>4</sup> This is the essence of his ideal: the philosophic man.

Plato's philosopher, consequently, as depicted in the *Republic*, aims to achieve a twofold proportion: proportion not only among his own faculties, but also, and more importantly, between himself and God. The harmony within man is not the sole harmony, but the image and reflection of that greater harmony of man and God. The harmonious development of the human faculties, of body and mind, is for Plato not an end in itself, but a means towards the ultimate perfection of the soul, that it may not be impeded in its journey toward light, the vision of the divine.

In contrast to this Platonic ideal, even though claiming continuity with it, stands the ideal of those New Hu-

manists who would draw a line of demarcation, sharp, clear, and absolute, between the human and divine; they would say that man's perfection as man is to be sought within himself, without consideration of aught above and beyond himself. "It [humanism] represents man's effort to define or realize his humanity as distinguished from his animality on the one hand, and his divinity on the other."<sup>5</sup> Furthermore, Mr. Foerster remarks, just as we may differ with regard to what the peculiar note of man as man really is, so we may speak of different humanisms.<sup>6</sup> Now, in place of the criterion above and beyond man, certain Humanists would set up man's critical faculties, backed by the constants of tradition, of human tradition, that is, as distinguished from the spiritual tradition. Mr. Foerster writes: "The final effort of the modern or critical spirit must be to render clear and commanding an inner authority competent to take the place of outer authority."<sup>7</sup>

Without seeking at present to evaluate finally this "inner authority" as an ideal, we may say that it seems to be inconsistent with humanistic ideals, for two cogent reasons. The first is that, although the Humanists claim continuity with the Greek conception of humanism, as set forth by Greek thinkers, like Plato, nevertheless, their ideal conflicts directly with that of the Greeks concerning the very essential of humanism, namely, the true nature of man's perfection as man; for to the high Platonic ideal of a soul finding its perfection in union and conformity with the divine, this ideal opposes a necessarily insufficient development of those faculties of man that distinguish him from the animal below and the divine above. Secondly, such an ideal is untrue to its own first principle of universal selection of "constants." For is it not an irrefragable fact that, of all possible constants in human tradition, man's dependence on and relationship to the divine is the most universal and constant? To maintain their position, then, it appears that these Humanists must renounce their claim of continuity with the Greeks, especially with Plato; and they must also deny their first principle of universal selection.

Indeed, if we were asked to point out what, at first glance, seems distinctly Grecian in the program of the New Humanism, we should unhesitatingly point out the ideal of proportion. Proportion was indeed the essence of the spirit which animated Greek art and thought; and this is especially true of Plato. Here we may note that for Plato and the New Humanists of whom I have spoken the significance of "proportion" is profoundly different; and the difference derives directly from their disagreement as to the perfection of man.

Plato, who conceived man's perfection as a conformity to and almost a participation in the divine, regarded proportion as a means. Its first significance for him was a



reproduction in ourselves of the perfection of *to agathon* according to our capacity. Furthermore, since the ideal for which man strives is perfect and immutable, the work of approximation and conformity is, consequently, a steady and ordered progression which can be marked and guided by the perfect and immutable ideal. Secondly, as he so picturesquely describes it in the eighth book of the *Republic*, in the fable of the monster, lion and man, proportion meant for him the balance and harmony among the various elements in man. Proportion in this sense means largely proper subjection, for it is an adaptation of means to end, an alignment in proper sequence. As the end and perfection of the highest element in man, the rational soul, is conformity to divine perfection, so the end and perfection of his other faculties is to aid the soul in achieving this conformity. Those faculties which are most conducive to this end are to be cultivated; those which impede or retard its attainment are to be checked and subordinated.

Many critics have noted that Plato did not fully appreciate the integrity of the union between man's body and soul, each of these incomplete without the other, and that he envisaged a perfection of the soul entirely freed from the body. But this does not in any way disrupt the unity of his concept of proportion. He recognized that as long as the soul is in the body it is in some way affected by the body. His aim was so to subject the body to the soul as to render it not only not an impediment, but even, as far as possible, a positive aid in attaining the soul's end.

Thus, in his concept of proportion Plato can truly be said to stress the efficacy of man's natural powers as *contributing* to the attainment of his perfection; but he realizes further their insufficiency, of themselves, to achieve it.

But the Humanist who rejects the notion of a divine model of man's perfection places a different value on these natural faculties than did Plato. "Proportion" for such a Humanist does not mean the large conformity of man with the divine but solely the internal harmony of man's own faculties; for he makes the distinctly human perfection of man consist in this very proportionate development. But this claim seems to be contradicted by human experience and by the testimony of those very powers of man; for we see that among all peoples the highest exercise of reason, led by an inward illumination that might be called a part of the natural law, has recognized the need of the divine. To take but a single example, we see how Plato, who desires no less than does the New Humanist the full blossoming of the powers of man, recognized the need of something beyond. He was brought to this conclusion by reasoning on the nature of those very powers; for, although he saw that they were capable of putting man far ahead on the road to perfection, still he further perceived that something more was necessary to the attainment of the goal. In maintaining the sufficiency of the powers of man to attain complete perfection the Humanists of our day would seem to be unwilling to follow out to the full the conclusions of reason and the precepts of tradition and to content themselves with a perfection which the greatest thinkers, while

recognizing it as noble and desirable, have perceived to be incomplete and inadequate.

The limitations of this perfection—if it may be so called—become evident when its proponents attempt to evaluate the several faculties of man without integrating them towards a higher perfection. Plato ascribed superiority to the faculties according to their instrumentality in promoting the work of conformity. Withdraw this higher aim and there follows conflict as to just what the superior faculty is, a question over which the New Humanists seem to be divided. And even if they should agree on one faculty as supreme and attempt a process of harmonization, they will end in the very one-sidedness they are seeking to avoid. If they accept as the highest power in man the power to know, and subordinate all other faculties to the perfection of the intellect, the result will be intellectual one-sidedness. Again, if they assert that superiority resides in the will, then the result will be equally disproportionate. Consequently, such Humanists are forced to adopt a policy of restrictions that can scarcely lead to positive perfection, and, as a result, their ethic runs a great risk of degenerating into mere moral opportunism.

Thus are we confronted with the strange contradiction of a school of thought which claims continuity with the Grecian pre-Christian source, and yet is blind to the most significant tendency in the best thought of that source—the inclination towards the Supreme Being, the groping for the divine.

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- <sup>3</sup> "The identification [of the Idea of Good with Plato's philosophical conception of God] has often been challenged; but the difficulties involved in any other hypothesis appear to be insuperable." — Adam, *Religious Teachers of Greece*, Lecture XXI; p. 442. Whether divine or not, the Idea of Good yet remains as a criterion of perfection external and superior to man.
- <sup>4</sup> Cf. *Republic*, bk. v, 474-502; bk. vi, 505-509; bk. vii, 514-520.
- <sup>5</sup> Foerster. *Op. cit.*; p. 6.
- <sup>6</sup> *Ibid.*
- <sup>7</sup> *Ibid.*; p. 211.

The May number of *The Modern Schoolman* will bring out *Neo-Scholasticism: A World View*. The authors trace the history of this philosophical movement, discuss its present status, and forecast its probable future.

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# Where Is Formal Color?

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There is a theory of color sensation which maintains formal color is not in the object sensed but only in the very act of visual sensation. The exponents of this theory have been vigorously attacked in scholastic circles on the grounds that such a theory cannot be reconciled with certain epistemological facts. The disastrous result, it is told, is Kantianism. Whether or not this objection is valid we shall have occasion to observe later. At present, we may begin with the facts upon which this theory is based.

The fundamental facts are these: first, most bodies are primary sources of light; secondly, in order to be seen, these bodies must reflect light waves; and thirdly, colored bodies do not reflect all the waves that fall upon them but selectively absorb certain rays and reflect the rest. Now, all will agree that whatever we know directly of color we know only from sensation. We say a thing is red only because we perceive it as red; we can know red only through or by means of sensation. Hence, those who claim that formal color exists in the object sensed do not deny that our sensation is a sensation of formal color; but they add that formal color is not only in the sensation but also in the object. To establish our theory, we must show that what we see and what is in the object are not the same formally, in other words, that the color as seen is not in the object exactly as it is in the object.

What are the facts? If two men with equally clear vision look from different angles at the same spot on the back of a pigeon, or on a soap bubble, one man may see purple at the same time that the other sees green. But, what each man sees is formally in the object, that is, the object exactly as he sees it, that spot is at the same time purple and not-purple, green and not-green. This, it is subtly, cannot be; either the purple or the green is verified formally in the feathers. And if one of the colors is formally in the object, how then can we say that the senses are infallible? If, on the other hand, we say that the object is only the cause or foundation of color in the sensation, the phenomenon is easily explained, because fundamental color really varies with the medium in which the light is propagated to the eyes of the observer; for one person interference destroys one ray, for another, another ray.

Again, blue and yellow powders sprinkled over a white surface give us the sensation of green. Yet, on examining the same surface under a microscope, we see only blue and yellow particles. Now, if formal color resides in the object, the new color, green, adheres in the disparate particles either collectively or separately. But green adheres in neither of these ways, that is, neither in the particles

taken separately, because we know that they are as a matter of fact blue and yellow, not green, nor in the particles taken collectively, for if this were the case, a single quality would be adhering in contrary subjects. We conclude, therefore, that the green in the sensation of the onlooker is not verified formally in the object. But where is this green? We reply that it is only causally in the object. The yellow pigment absorbs all except the red, yellow, and green rays, while the blue pigment absorbs all except the blue, violet, and green rays; between the two they absorb all except the green; these are reflected. Hence, we see green, but this is not formally in the object.

These and many other phenomena defy explanation except by the theory here proposed. Indeed, this seems to be the one theory which fits all the facts. The only serious objections arise from the epistemological viewpoint. Before meeting these difficulties, however, we should first exclude the medium (ether) as the possible locality of formal color.

In the following experiment I omit many of the more complicated details. If a disk half red and half blue is revolved rapidly before a mirror, an observer, if he looks directly into the mirror, will see purple; but, if he looks into the mirror through a radial slit in the revolving disk, he will see only red and blue, just as if the disk were not in motion. "This experiment proves that the compound disk undergoes no physical change of color during rotation and that there occurs no physical mixture of the lights reflected from the two sectors of the disk."<sup>1</sup> This experiment assures us of two facts: first, formal color is not in the object, for obviously, purple is not formally in the disk; secondly, color is not formally in the medium, since, even while the disk is revolving very rapidly, it gives off only blue and red rays. But again, where was the purple in the first instance? Our answer seems the only scientific one: the purple was in the sensation alone.

The theory proposed does not assume that these waves produce two color sensations which then complement each other so as to form a compound sensation of purple. Our experience of purple is only a physiological disturbance set up in the organ of sight by a definite pair of lights of different wave lengths. In explanation of this phenomenon it may be sufficient to say here that the normal after-image remains about one-eighth of a second after the stimulus has ceased to be operative, while the rate of the revolutions of the disk is much greater. Thus, when two such stimuli act in quick succession on the same retinal elements, each will tend to neutralize the specific disturbance set up by the other. On the strength of such facts we conclude that formal color is neither in the object itself, nor in the medium, but in the very act of vision.



Someone may here interpose that the preceding phenomena are abnormal and that the arguments are, therefore, illegitimate. The arguments used, however, are not based on abnormal conditions. Who has not observed, for instance, the changing colors which flash from the iridescent neckband of a pigeon? or the various colors of a soap bubble as it floats through the air? Nor are these phenomena abnormal in the sense that they are not governed by any laws, or, that they cannot be reproduced at any time under the given conditions. Hence, they can and must be explained.

An opponent might press us by saying that in order to prove that color is not formally in the object, as in the case of soap bubbles, we postulate a change in the angle of observation and thus render our argument invalid. To this objection we reply with the question: "Is not the *same* spot under observation? Consequently, those who hold that formal color is in the object antecedent to any inspection and therefore independent of inspection, would they not have to admit that the same spot is at the same time red and not-red, green and not-green?" This objection, then, turns out in favor of our theory.

We are now prepared to meet the epistemological objection, namely, that this theory destroys the validity of sense perception. In substance the objection comes to this: If, as we assert, the senses do not perceive the object as it *is*, then, they err by their very nature, that is, an intermediate object of knowledge is introduced and we are unavoidably deceived. This, of course, would be calamitous.

To answer this objection effectively we shall have to explain more fully what we mean by the statement that the visual organ cognizes the object not as it is, but as it affects this organ here and now. This simply means that in sensation we do not cognize the *essence* of the object, but merely experience the object *as it affects the sense organs here and now*. It is precisely and only in the perception of this appearance that the senses report unerringly. Epistemological arguments prove clearly that the senses do not cognize the essence of an object; the simple apprehension alone does this. To the question: What *is* this thing?—the sense makes no response. If the senses were capable of cognizing the essence, even of sensible qualities, wherein then would lie the essential difference between sensitive and intellectual cognition? With St. Thomas we say: "... to be cognizant of the natures of sensible qualities does not pertain to the senses but to the intellect."<sup>2</sup> The senses perceive sensible qualities as they *appear*; the intellect alone perceives the *nature* and *essence* of these sensible qualities.

But precisely how does this theory avoid Idealism? How do we preserve the infallibility of the senses? This requires that our sense cognition must be immediate, that is, we must nowhere introduce some mediate object which is cognized as a sign of the sensible object antecedently to the cognition of the sensible object itself; we must not introduce what Aquinas calls a "*medium quod*," or that which first being cognized leads to the cognition of something else. A picture of Lincoln, for instance, if I had

previously known nothing about his appearance, would be a sign which first being cognized leads me to an idea of the appearance of Lincoln himself; such an idea would be mediate. Now, we admit that to establish our theory we must show that we do not introduce sensation as a *medium quod*, or as something which first being cognized leads us to the cognition of color.

But, according to our theory, that which is seen and that which is in the object are not formally the same. "Therefore," an opponent may urge, "your theory makes sensation that which first being cognized leads to the cognition of color; you introduce a mediate object which must be cognized as such antecedently to the color itself; you cognize first the sensation, then the color; you make sense cognition not immediate, but mediate." But, we answer to say that what we see is not formally in the object, but is not the same as to say that we cognize first the sensation and then the object. In other words, the disjunction is, namely, that sensation either must be known as a means to knowing the object or must not be known at all, or is incomplete. There is a third possibility: the medium *in which* we see the object.

An example will illustrate our terminology. A mirror is that in which we see an object; neither the light rays nor the mirror is that which is cognized as such. We see formally only the image in the mirror. Speaking analogously, we may say that just as we see objects in a mirror, so we cognize color *in* our visual sensations. Hence, the sensation is not *that which* we see but *that in which*. We see not the mirror but the object in the mirror; neither do we see the sensation, but rather in the sensation we see the object itself, that which appears red, or green, or blue. Hence, we conclude that the thing which *causes* the sensation of color is in the object, but that we see the formal color *in* the sensation alone.

To say, therefore, that this theory leads to Idealism or Kantianism is to neglect the distinction between the intellectual perception of an object in as far as it is sensible and the intellectual perception of an object in as far as it is intelligible.

It may still be objected that since seeing an object in a mirror is not the same as seeing it directly, we have not as yet explained *how* formal color is in the sensation only. To understand the solution of this question a few words concerning the scholastic theory of intellectual cognition will not be out of place. According to this theory intellectual cognition is simply immediate, that is, there is nothing which first being cognized leads the perceiving subject to the cognition of the object. Nevertheless, from another aspect we can say that intellectual cognition is mediate, for between the object and the perceiving subject is what the Thomists call the *verbum mentis*, a word or term of the mind, or a mental sign *in* which, without any reasoning or reflection, the object is immediately perceived.

Now, in explaining how formal color is in the sensation alone we apply this theory to the external senses. We say that sensitive cognition is simply immediate in so far as



nothing which is first cognized and from which the cognition deduces to the object; but we also say sensitive cognition is, as it were, mediate, because we cognize objects except in this analogous *verbum*, in which we see the object as in a mirror. We remember, however, that these expressions are used loosely; but this does not mean that our solution is on a fantastic creation, for, as we have seen, it has its place in the scholastic theory of intellectual cognition.<sup>3</sup> This analogous *verbum mentis* we can illustrate by an example. It is commonly admitted that there is no cognition without an accompanying phantasm, at least a phantasm of the word signifying the idea. Now such phantasms are present when I am looking at a ball game, yet I do not pay any attention to them; what I see is the game. So, too, if I later recall the game, I see the phantasm, indeed, but pay no attention to them. Likewise, in the case of sensation, I am not conscious (and sensation is not conscious awareness) of the sensation as such, but of the

object. Thus, I do not see the phantasms and then deduce to the game, just as I do not see a mirror and deduce to the objects reflected in it. I go directly to the object which is the foundation or cause of the sensation. So in color sensation, what I see is not the object as it is, but as it affects the sense organs, that is, as it is formally in this mirror or analogous *verbum mentis*. Call this mirror in our analogy what you will, yet it is not a *medium quod*. Hence, the theory which we have proposed does not lead to Idealism, Kantianism, or any other philosophical heresy; but it does explain the facts.

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- <sup>2</sup> Aquinas, St. Thomas. *Sum. Theol.* Ia, q. 78, a. 3, corp.
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## Herbart and Aquinas—Educators

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A synopsis of the history of philosophy and another of the history of education placed together in parallel columns is an interesting study. It has been pointed out that the revolution in philosophical thought has not only registered in the field of educational theory, but has found its way into the classroom and influenced teaching methods. This truth is well exemplified in a parallel study of the philosophical tenets and educational methods of Frederick Herbart, a man who has had untold influence on modern education, and of St. Thomas Aquinas, a great teacher of the Middle Ages.

Herbart was a philosopher; but he was far too practical-minded to transmit to some follower the task of applying his theories to the educational world. In fact, his methods rather than his theories were the result of classroom experience, and he constructed a philosophy and psychology to correspond with them. For the sake of clarity we will first review his psychology and then see how he applied it to the three great steps in his educational system, namely, intuition, the development of interest, and the resultant activity.

Herbart begins his psychology with the postulate that the soul is a simple essence whose only function is self-preservation. Without explaining the why or how of this mental doctrine, he "rejects as a pure myth the idea that there is in the human mind any independent or immaterial faculty whose function is to will, and which is free."<sup>1</sup> In a sentence, his doctrine could be stated as follows: Ideas are the sum total of all that is important in the life of the mind. Through sense-perception the soul, by self-preservation, comes in contact with the real

beings outside; the result is an idea. Each idea carries with it a certain degree of interest, depending upon the individual concerned; and successive ideas, as they make their appearance in the mind, join hands, as it were, with those already there. Thus are formed "apperceiving masses," which have connected with them, in proportion to their development, a greater or less degree of interest and desire.

These compounded ideas continue to grow until of a sudden we have a volition. According to Herbart a faculty for willing, strictly so called, is superfluous, since a volition is merely an idea in full bloom, a thought which has associated with it a sufficient amount of interest to make it a desire. The actions of the mind thus described evidently become purely mechanical, but Herbart seems satisfied that his doctrine of apperception explains the spiritual as well as the material part of thought and will.

With this necessarily brief outline of his psychology let us turn now to the first of his important educational steps—instruction. The Herbartian teacher realizes that the minds of the pupils before him are merely constructs. Since their souls possess nothing, and can possess nothing, but ideas, the kind and manner of instruction immediately assumes tremendous importance. One would think that almost everything depended upon it, and Herbart is emphatic in so affirming: "I here at once confess, that I have no conception of education without instruction."<sup>2</sup> If the Herbartian teacher were to pour ideas into the pupil's mind as he would apples into a basket, anything like an ordered intellectual development could never result. That proper mental construction take place, he must so present ideas that they will unite, coalesce, and become associated into compact masses. To guide the teacher in this mind-



building project Herbart has laid down "Five Formal Steps of Instruction," which are nothing more than the age-old inductive and deductive methods dressed up in modern fashion.

But, what force will cause the pupil to reach out for knowledge, to grasp each idea as it is presented, and to fit it into a scheme after which he will pattern his conduct? For Herbart's disciple only one word spells the answer—interest, the second step in the educative process. Consequently, the Herbartian war-cry has ever been: Develop a many-sided interest! The burden of the teacher's task, they say, is so to arrange, correlate, and present the matter that each succeeding thought adds to the amalgam of ever-developing interest and desire which finally ends, if we may use a word which does not belong here, in will-power.

Herbart says that interest is of two kinds: first, that which comes from our knowledge, and, secondly, that which arises from our dealings with others, that is, from our social life in the family, the school and the community. Interest from cognition, the first division, is subdivided into three species: empirical interest, aroused by observation; scientific interest, excited by speculation; and aesthetic interest, caused by the contemplation of beauty. Interests of participation originating from association with others are also of three kinds: the sympathetic interest, that is, the sharing of the joys and sorrows of others; next, the social interest, or the ideal of service to mankind; thirdly, the religious interest, which Herbartians say can be developed indirectly even though nothing positive concerning it be taught.

Herbart's followers are extremely enthusiastic about this many-sided interest, and absolutely assured of the success of their method if correctly applied. We quote Staude's eulogy:

"Interest is the light with which Herbart has once for all brought the dark and tortuous course of didactics into the clearness of day. It is the charmed word which alone gives power to instruction to call the spirit of youth and to make it serve the aim of the master. It is the lever of education, which, lightly and joyfully moved by the teacher, can alone bring the youthful will into the desired activity and direction."<sup>3</sup>

Finally, this many-sided interest leads to the third step, the result of all that has gone before—the formation of character. The contradiction in Herbart's system is here immediately manifest, since he has substituted a fundamentally mechanical apperceptive mass for the intellect, and has failed to admit any faculty of free will. Consequently, he has destroyed any possibility of true morality. Thus, though he would not admit it, he is forced to become guilty of an error often repeated and just as often disproved by disastrous experience; he must say that character depends solely on enlightenment, that knowledge is virtue.

Thus is traced, in short, the system of one of the most outstanding heralds of modern education; and such is the influence of his philosophy on his educational practices. It may now be interesting to go back to the "naive" Middle Ages and make a similar study of St. Thomas Aquinas, philosopher, theologian, and teacher preeminent. Not only

has Aquinas given us in his writing a thorough exposure of his psychology, but fortunately he has also explained the *De Magistro* its application to educational theory and method. This treatise, being only part of a series of disputations on the theory of knowledge, is quite short and not explicit enough to be understood thoroughly unless properly correlated with Aquinas' philosophical system.

His psychology, like Herbart's, is here of prime importance. Starting at a point miles removed from that of Herbart, St. Thomas not only draws a sharp distinction between the senses and the intellect, but also points out a definite difference between the faculty of thought and the faculty of choice, the free will. The soul, as conceived by Aquinas, which, though single and simple, has countless distinguishable operations, is something far removed from the mere mechanical structure which Herbart calls "mind." Assuming that the mind is nothing more than a receptacle, Herbart made its chief function a decidedly passive one. But if there is anything that St. Thomas is at pains to bring out in the *De Magistro* it is this: The mind in regard to learning is essentially active. Besides the passive ability to receive forms as they are presented to it through the medium of the senses, the intellect of man has also an active power of abstracting the intelligible forms from the phantasms or sense images; we have the power, possessed only in an analogous manner by the brute, to think back over previous experiences, rationally to compare present with past objects, to associate their meanings, and to determine the attitude we will adopt towards them. The important consequence of this fact is well put by Mary Helen May: "Hence, man is responsible for the order of his intellectual memory, his intellectual habits, his character."<sup>4</sup>

Turning to the application of this psychology to education, we foresee that St. Thomas and Herbart must differ radically in their conceptions of the functions of instruction, the latter's first educational mile-stone. Herbart glorifies instruction; St. Thomas, though far from despising it, puts it where it belongs. As a prelude to the decision regarding the place and importance of instruction Aquinas points out a fundamental fact upon which the decision will entirely depend. He writes:

"It must be kept in mind that in natural things, a thing may preexist potentially in a twofold manner: in one way active, complete potentiality, that is, when the intrinsic principle is sufficiently able to bring it to perfect actuality. In another way a thing can preexist in passive potentiality when the intrinsic principle is not sufficient to educe it to actuality . . ."<sup>5</sup>

An example of the first "is evident," he says, "in healing for through the efficacy of nature in the sick person, health is brought to health." As an instance of the second he mentions the fact that combustible material by being exposed to the air will not burn. The air has only a passive potentiality to produce fire, which, to be brought into being, requires an extrinsic agent.

He then applies this twofold distinction of active and passive potency to the mind.

"Knowledge, therefore, preexists in the learner, not



rely passive potentiality, but in active potentiality. . . .  
 st as a person may be cured in a twofold manner, through  
 e operation of nature alone or through nature with the aid  
 e medicine, so there is a twofold manner of acquiring knowl-  
 ge, the one when the natural reason of itself comes to a  
 owledge of the unknown, which is called 'discovery,' the  
 her when someone extrinsically gives aid to the natural rea-  
 son, which is called 'instruction.'"<sup>6</sup>

ere we have a clear expression of the status of instruc-  
 as Aquinas saw it—an important, but not the most  
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 ally self-activity.

nce the purpose of teaching is to guide the reason to  
 overey," the important place of interest, Herbart's se-  
 step, can be immediately ascertained. The word "dis-  
 y" seems almost of itself to connote interest, and a  
 study soon makes one aware of St. Thomas' appre-  
 on of its necessity and value. He clearly understood  
 made use of the "psychological mode of approach"  
 aching, sometimes so loudly heralded as a modern edu-  
 cal invention. One of his most obvious yet effective  
 es for arousing the natural inquisitiveness of the pupil  
 manner of beginning each treatise with a formidable  
 of well-put objections to the thesis he will afterwards  
 vor to establish. These objections were not fabrica-  
 spun out of his own mind and proposed because most  
 crushed by his proofs, but were usually actual argu-  
 s proposed by leading philosophical adversaries. Then,  
 der to bring the pupil to a still greater pitch of inter-  
 t. Thomas balances these opposing opinions as nearly  
 ssible by quotations from outstanding authors who  
 a favor of his own doctrine. When the student has  
 ne sufficiently puzzled by the conflicting evidence, and  
 xious for the correct solution, Aquinas, in the body of  
 rticle, lays down a precise explanation and proof of  
 ntention. Here, too, careful study of his positive  
 ing method will reveal the use of very many of the  
 ve devices which modern educational science proposes  
 rousing interest; while the many ineffective methods  
 ested today he will be found wisely to have omitted.  
 ing his strikingly modern methods might be men-  
 H: the frequent use of symbols, illustrations and  
 gies, as great a simplicity of diction and structure as  
 ple, the presentation of the historical state of each  
 on, the connecting and relating of previously acquired  
 newly acquired knowledge, and the clever means of  
 tion, and opportunity for the student's practical han-  
 of the facts just learned, which is provided for by  
 answers to each objection given after the body of the  
 .  
 hat is to be said of St. Thomas in regard to the third  
 ast step in Herbart's educational system, the forma-  
 of character? Herbart, though expressly declaring  
 to be the whole of the educational purpose, destroys

by his false psychology the only possible foundations of  
 character. The Angelic Doctor, on the other hand, has  
 something upon which to build his edifice of morality—an  
 intellect whose object is truth and a free will whose object  
 is the good. Knowledge of itself is not virtue, and char-  
 acter is not simply a matter of enlightenment. Education,  
 to be complete, must do more than impart cold facts. Be-  
 sides so leading the student that his intellect may assimilate  
 truths into permanent, living components of his mental  
 equipment, it must train the will to respond to noble  
 motives and to choose what is best. Only then will the  
 finished product of education be a thoroughly desirable  
 character acceptable to both God and men.

Thus, it once again comes home to us that much of the  
 best that modern educational science offers us can be found  
 in the writings of the great teacher of the Middle Ages.  
 And these effective educational theories and methods are  
 the outgrowth of a philosophy that is scientifically sound.  
 Perhaps for some the title "Angelic Doctor" will now take  
 on an added meaning. We should consider St. Thomas as  
 a doctor not only in the passive sense, so to speak, as one  
 whose philosophical knowledge was profound, but also,  
 and perhaps more truly, in the active sense, as one skilled  
 in leading the minds of others on to that same knowledge,  
 in a word—the ideal teacher.

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- <sup>5</sup> *Ibid.*; p. 51. Cf., *De Ver.* (1), q. xi, a. 1, resp.
- <sup>6</sup> *Ibid.*; p. 52. Cf., *De Ver.*, *ibid.*

#### RELATIVE SPACE

(Continued from page 62)

tion of the ultimate nature of space as "abstract extension  
 considered as a receptacle for bodies." With this concept  
 of space, it makes little difference whether these bodies  
 present to different observers the same length or not. All  
 of them are conceived as being contained in what we call  
 "space."

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## BOOK REVIEWS

### THE CHRISTIAN SOCIAL MANIFESTO

By the Rev. Joseph Husslein, S.J., Ph.D.

Bruce Publ. Co., Milwaukee, 1932

In the years 1891 and 1931 two papers of extraordinary importance to students of society and social ethics issued from Rome in the form of encyclical letters to the Bishops of Christendom: the *Rerum Novarum* of Leo XIII and the *Quadragesimo Anno*, better known as *The Reconstruction of the Social Order*, of Pius XI, the latter reaffirming what the former had laid down a generation before. They were wise, insistent voices speaking to men of problems which the world thought peculiarly its own. Regarded at first with resentment, they are gradually being recognized as part of those scriptures in which is written the economic salvation of mankind. Very definitely they are a challenge to modern industry to set its house in order, and fortunately they come at a time when business is disposed to view with some gravity the moral aspects of its problems.

Fr. Husslein has caught the spirit of that challenge admirably in the pages of his *Manifesto*. In this comprehensive and illuminating commentary on the encyclicals, neither too burdened with economic theory, nor too concerned with naked principles to be beyond the grasp of the average reader, he has given us a timely and inspiring guide for social worker and business man. It is rich with historical application, notably fair in its exposition of Socialism, and particularly shrewd in applying the doctrine of the two encyclicals to economic practice. Perhaps the most valuable chapters of the book are those devoted to the Socialist program and to the Christian workers' cooperatives which the Popes have envisaged as the chief means of ameliorating the working man's lot. Fr. Husslein is at his best when treating the modern counterpart of the medieval guild, and he has carefully distinguished the Marxian opposition to productive property from a rejection of all private ownership, a distinction too frequently neglected. The chapters are running commentaries on the major points of the encyclicals, and the letters themselves have been appended, with *Quadragesimo Anno*, which was issued without numbered paragraphs, divided into sections similar to those in the Vatican edition of the *Rerum Novarum*.

It has been Fr. Husslein's privilege to bind these two documents into a volume that is quite indispensable to the professor of ethics. The *Manifesto* does not pretend to be definitive. It is merely the groundwork upon which future studies may be built. But it bears the stamp of thorough treatment, the fruit of the long and earnest study of a recognized scholar.

G. G. GRANT.

### MAN AS PSYCHOLOGY SEES HIM

By Edward S. Robinson

The Macmillan Co., New York, 1932, \$2.50

This book by Professor Robinson of Yale is a popular presentation of contemporary American non-scholastic psychology. It was written for the layman and there is a commendable lack of the usual psychological jargon. Professor Robinson attempts to explain why we act as we do, why we think and feel as we do, why we talk as we do. There are two sections in the book: the first deals with the nature of man; the second with the aims, the deeds, and the follies of psychology. Chapter X contains some illuminating criticism of contemporary schools of psychology.

To a Scholastic reading this volume comes the painful realization of the American psychologists' ignorance of the neo-scholastic movement. Not a single scholastic writer is mentioned; nor is there the slightest indication that the learned author ever heard of the scholastic position. The very existence of a spiritual soul he dismisses as a belief of the "naive mind." Even an undergraduate student of scholastic philosophy would laugh

at the two reasons, according to Prof. Robinson, why primitive folk (Mercier, for example, or Newman, or prize book like Hilaire Belloc and G. K. Chesterton) held to this belief in dreams and the phenomena of birth and death. It would be much to expect the Professor of Psychology at Yale to investigate what the psychologists of Louvain are teaching, or to delve into the writings of Lindworsky or Froebes or Thomas Vernon Moore, or even to spend a half-hour with a manual of scholastic psychology such as Maher's. But then the title of his book would have to be changed. Instead of "Man as Psychology Sees Him" it would become "Man as the Professor of Psychology at Yale Sees Him."

Like most professors of brass-instrument psychology, Professor Robinson has no time for the trivial facts of history. He is of the opinion, apparently, that the only explanation of the distinction between soul and body is that of the Cartesian exaggerated dualism which he contemptuously dismisses as the "Little-Man-in-the-Head Theory."

His pontifical utterance deserves to be quoted, if for no other purpose than to provide mirth for the class in introductory logic. "With the development of modern psychology it has become increasingly evident that a soul which is a mere immaterial duplicate of the bodily self serves no useful intellectual purpose. One is studying thinking and reaches the conclusion that thinking is done by an inaccessible spirit, scientific inquiry is definitely balked. One has simply stated the question in a form which discourages scientific investigation." There is only one thing wrong with that quotation; the last sentence should have read: One has simply misstated the problem.

WILLIAM J. MCGUCKEN.

### ST. ALBERT THE GREAT

By the Rev. Thomas M. Schwertner, O.P.

Bruce Publ. Co., Milwaukee, 1932, \$3.00

This balanced portrayal of a great Scholastic has decided value for the student of philosophy. Set as it is in the midst of the thought-currents of the Thirteenth Century, it enables us to evaluate and understand better the service Albert rendered to the development of Christian philosophy. We take for granted the Christian Aristotelianism now predominant among us; but the future was by no means promising when Albert put his hand to reinterpreting the true thought of Aristotle and throwing it in line with the Christian tradition. He may be said to have saved Aristotle from his interpreters, for he swept away in his masterly exposition the accretions of Jewish and Moslem commentators that had brought the whole Aristotelian corpus into suspicion of irradicable heresy.

This service would have been enough indeed to assure lasting place to the name of Albert; yet it was but a single phase of his multiple activity in philosophy and science. Many of the great schools owe their founders to Albert; he developed not only the philosophic gifts of Aquinas but also the more Platonic genius of Ulrich of Strasburg and the scientific minds of Michael Bréal and Stanislaus Rozycki "who gave Poland the best scientific books in their day, all filled with the audacious spirit of Albert and his suggestive and inventive temper." These are, however, but a few of those who felt his influence; almost every prominent school of science, of philosophy and of mysticism in the later Middle Ages owes something to the universality of the latest *Doctor Ecclesiae*.

Such is the information and stimulus that a student will find in this very interesting book. The redundant style and looseness of structure will hardly distract the reader as he watches the brilliant and varied career of this tireless student, a career whose eighty years coincide with one of the world's most remarkable outbursts of philosophic thought.

ROBERT J. HENLE.



THE HISTORY OF SCIENCE AND  
THE NEW HUMANISM

By George Sarton

Henry Holt & Co., New York, 1931, \$2.00

When Professor George Sarton, a Belgian scholar of distinction, driven from his home by the Great War, came to this country to organize an institute for the history of science, Dr. James Walsh was prompt in pointing out that the enterprise was worthy of every encouragement. Since that time Professor Sarton has been constantly crusading for his cause through *Isis*, the magazine which he edits, as well as through books and lectures. The book in review comprises the Colver Lectures for 1930, delivered in Brown University. In it the author attempts to bridge the gap between science and the humanities as they are known today. He makes bold to call this movement the New Humanism, "because it is deeply humanistic, yet diametrically opposed to the old humanism which was characterized by nothing more clearly than by its strong anti-scientific prejudices." His argument that natural science is a humanistic study, because its results must be correlated and interpreted by human minds, is based on a definition of humanism that is broad in the extreme. His general treatment, however, shows clearly enough what Professor Sarton really wishes to do through his history of science is to promote a more or less rational humanism among scientists.

This little volume will make a pleasantly provocative *vade mecum* for the scientist or humanist en route to some convention. The humanist, especially if he be devoted to Greek archeology, should take precautions that his Pullman window be closed when he reads, "there are Egyptian statues of the early dynasties which are not a whit inferior to the best Greek productions."

ROSWELL C. WILLIAMS.

EXPERIMENTAL PSYCHOLOGY

By the Rev. Hubert Gruender, S.J.

Bruce Publ. Co., Milwaukee, 1932, \$2.50

In this recent addition to the "Science and Culture Series" the scientific method prevails. Spurning the refinements of the Structuralists and the metaphysical dark room of Titchener and his followers, Father Gruender investigates the facts of man's conscious life in the broad light of day, states with unusual clearness and accuracy what he has found, and then checks up on the data thus obtained by a careful consideration of man's behavior and physical activity. In a word, he makes use of that rare virtue—common sense. His examination of rival theories on questions like sensation, imagination, memory and instinct is painstaking and eminently fair; the judgments he pronounces on them are clear and to the point.

Special mention must be made of the author's treatment of thought and will processes. Here he appears at his best, discussing the various problems carefully and evaluating with a "saving sanity of judgment" the statements of Behaviorists, Psycho-physical Parallelists, Structuralists and Sensationalists alike. As an instance in point, we may cite his handling of Dr. Koehler's experiments with anthropoid apes. Father Gruender states the problem to be solved, shows its vagueness even in the mind of Dr. Koehler, examines the conclusions drawn from the various hypotheses and then shows that they are not warranted by the experimental data at hand.

Further features of the book are its unequivocal definitions of psychological terms, its many tables and diagrams and, finally, its lucid exposition of the author's own experiments. The book should appeal to the general reader as well as to the student and teacher of experimental psychology. EDWARD L. WIEBER.



